

WHAT IS CLAIMED IS:

1. A solution casting process comprising steps of:

casting dope on to a support by use of at least one solution casting die, to form self-supporting cast film,  
5 said dope including polymer and solvent;

stripping said self-supporting cast film from said support;

drying said self-supporting cast film by use of a drier while said self-supporting cast film being stripped  
10 is fed by at least one feed roller, to form polymer film;

wherein a surface temperature of said feed roller is set equal to or lower than 0°C, whereby said self-supporting cast film upon being stripped has modulus of longitudinal elasticity equal to or more than 450,000 Pa.

15 2. A solution casting process as defined in claim 1, further comprising a step of, while said self-supporting cast film is fed, blowing gas on said self-supporting cast film, said gas having a temperature equal to or lower than 0°C.

20 3. A solution casting process as defined in claim 2, wherein said self-supporting cast film includes first and second surfaces, and said first surface is separated from said support;

said gas is blown on said second surface, so as to  
25 ~~determine a drying speed difference (dW/dt) between said~~  
first and second surfaces equal to or less than 0.05 kg solvent per kg of solid per second.

4. A solution casting process as defined in claim 2, further comprising a step of, while said self-supporting  
30 cast film is fed, pressing a rotatable decurling roller on a first surface of said self-supporting cast film separated

from said support, to prevent occurrence of a curl on said self-supporting cast film;

wherein a surface temperature of said decurling roller is set equal to or lower than 0°C, so as to determine a drying speed difference (dW/dt) between said first surface and a second surface of said self-supporting cast film equal to or less than 0.05 kg solvent per kg of solid per second, said second surface being reverse to said first surface.

5 10 5. A solution casting process as defined in claim 2, wherein said casting step is according to at least one of multi-manifold solution casting and successive solution casting;

15 said dope comprises first to Nth dopes, said first dope has higher density than said second to Nth dopes, and is cast in a range extending to have two lateral edge portions of said self-supporting cast film, said second to Nth dopes are cast in a range of a middle portion between said two lateral edge portions, to provide said two lateral edge portions with said modulus of longitudinal elasticity equal to or more than 450,000 Pa.

20 25 6. A solution casting process as defined in claim 2, wherein two lateral edge portions of said self-supporting cast film upon being stripped has thickness A, and a middle portion of said self-supporting cast film disposed between said two lateral edge portions has a thickness B upon being stripped;

30 further comprising a step of forming said two lateral edge portions with said thickness A satisfying a condition that a ratio A/B to said thickness B is in a range of 1-5.

7. A solution casting process as defined in claim 2, wherein said self-supporting cast film includes first and

second surfaces, and said first surface is separated from said support;

further comprising a step of, while said self-supporting cast film is fed, keeping two lateral edge portions of said second surface at temperature equal to or lower than a condensation temperature of said solvent, so as to condense and collect gas of said solvent thereon even in gasification from said self-supporting cast film.

8. A solution casting process as defined in claim 7, wherein said at least one feed roller comprises first and second feed rollers;

said first feed roller includes a middle roll for contacting at least a middle portion of said second surface, and first and second chill rolls, secured to respectively first and second ends of said middle roll, for contacting and cooling first and second lateral edge portions of said second surface;

said self-supporting cast film is nipped by contact of said second feed roller with said first surface in cooperation with said first feed roller.

9. A solution casting process as defined in claim 7, wherein said feed roller has a surface roughness  $R_a$  in a range of 0.05-0.5 micron.

10. A solution casting process as defined in claim 7, wherein said at least one feed roller comprises first and second feed rollers, said second feed roller is positioned downstream from said first feed roller with reference to a feeding direction of said self-supporting cast film, said first and second feed rollers rotate at respectively peripheral speeds  $V_1$  and  $V_2$ , and a ratio  $V_2/V_1$  is in a range of 1.0025-1.1500.

11. A solution casting process as defined in claim 3, wherein said at least one feed roller comprises:

at least first and second feed rollers arranged in a feeding direction of said self-supporting cast film;

5 at least one third feed roller, disposed opposite to said first and second feed rollers with respect to said self-supporting cast film, and positioned between said first and second feed rollers with reference to said feeding direction.

10 12. A solution casting process comprising steps of:

casting dope on to a support, to form self-supporting cast film, said dope including polymer and solvent;

stripping said self-supporting cast film from said support;

15 drying said self-supporting cast film while said self-supporting cast film being stripped is fed, to form polymer film;

while said self-supporting cast film is fed, blowing gas on said self-supporting cast film, said gas having a  
20 temperature equal to or lower than 0°C, whereby said self-supporting cast film upon being stripped has modulus of longitudinal elasticity equal to or more than 450,000 Pa.

13. A solution casting process comprising steps of:

25 casting dope on to a support, to form self-supporting cast film, said dope including polymer and solvent;

stripping said self-supporting cast film from said support;

drying said self-supporting cast film while said self-supporting cast film being stripped is fed, to form polymer film;

while said self-supporting cast film is fed, pressing  
5 a first surface of said self-supporting cast film by use of a rotatable decurling roller, to prevent occurrence of a curl on said self-supporting cast film, said first surface having been separated from said support;

wherein a surface temperature of said decurling roller  
10 is set equal to or lower than 0°C, so as to determine a drying speed difference ( $dW/dt$ ) between said first surface and a second surface of said self-supporting cast film equal to or less than 0.05 kg solvent per kg of solid per second, said second surface being reverse to said first  
15 surface.

14. A solution casting process comprising steps of:

casting first to Nth dopes on to a support according to at least one of multi-manifold solution casting and successive solution casting, to form self-supporting cast  
20 film in a multi-layer state, each of said first to Nth dopes including polymer and solvent;

stripping said self-supporting cast film from said support;

drying said self-supporting cast film while said self-supporting cast film being stripped is fed, to form polymer  
25 film;

wherein said first dope is cast in a range extending to have two lateral edge portions of said self-supporting cast film, said second to Nth dopes are cast in a range of  
30 a middle portion between said two lateral edge portions, said first dope having higher density than said second to

Nth dopes, to provide said two lateral edge portions with modulus of longitudinal elasticity equal to or more than 450,000 Pa.

15. A solution casting process comprising steps of:

5 casting dope on to a support, to form self-supporting cast film, said dope including polymer and solvent;

stripping said self-supporting cast film from said support;

10 drying said self-supporting cast film while said self-supporting cast film being stripped is fed, to form polymer film;

wherein said self-supporting cast film upon being stripped is so formed that a ratio  $A/B$  of thickness A to thickness B is in a range of 1-5, where said thickness A is  
15 thickness of two lateral edge portions of said self-supporting cast film, and said thickness B is thickness of a middle portion of said self-supporting cast film disposed between said two lateral edge portions.